Remarks:

Applicant appreciates the Examiner's careful search and examination of this application and affirms the election of claims 6-13. The remaining claims have been cancelled, with the understanding that they may be presented in a divisional application. Dependent claims 30 and 31 have been added.

Please note that the specification provides enablement for a method that does not include inflating the product. On page 14, beginning on line 13, the specification states: **"Figure 15A shows a weld that was made using the same dies that were made to form the weld of Figure 15, but the space between the layers was not inflated during the welding process. The result was far superior to either of the results in Figures 16 and 17, producing a weld that is at least 50% as strong as the layer material 42, but not as strong as the weld shown in Figure 15, where internal pressure is applied to force the extruded material against the recessed areas 18, 118 during the welding process."**

While the specification teaches that the best results were obtained when internal pressure was applied to force the extruded material against the recessed areas during the welding process, it also teaches a method in which inflation is not used. Of course, if inflation is not used, then the weld does not have to be along a perimeter, and the welded product does not have to be inflatable. Thus, claims that do not include these limitations are not missing essential steps and should not be rejected under section 112.

The rejections for indefiniteness have been corrected by making it clear that the thickness of the material is reduced by a certain percentage.

The present invention teaches a method for achieving the strength of a butt weld from flat layers of material without requiring the material to be pre-formed in order for the edges to approach each other in an end-to-end, butt-weld direction. None of the other references teach or suggest such a method.

The Dojan reference teaches welding together flat sheets to form a valve, but it does not achieve the benefits of a butt weld. Weld flow directors are used to prevent material from extruding inwardly except at one end of the valve, where some of the material does extrude inwardly, forming a projection, which holds the layers slightly apart at that end. Paragraphs 0090 and 0091 on page 6 describe this process. Dojan also teaches in paragraph 0085 that the welds have sufficient strength and durability when the thickness of the weld area is reduced to approximately one-half or 50% of the total thickness of the layers prior to welding. It should be noted that the valve of Dojan does not require much strength at the welds and that it is relying on the strength of the weld between the

flat portions of the dies, not on the bead that is extruded in order to hold the parts together. Dojan does not teach compressing to less than 50% of the original thickness, and it does not teach a method for making a weld that is at least 50% as strong as the layers from which it is made. If the weld of Dojan were compressed more, as required by the claims of this application, it would result in a product similar to that shown in Figure 17 of the present application, which is weak. It would not approach the strength of a butt weld.

The Jones-Hinton and Rempel references both require pre-forming of the material prior to making the butt weld. In these cases, the material that is being welded is not made up of substantially flat layers lying on top of each other but rather is made up of hemispheres that are approaching each other in an end-to-end direction for making a butt weld. While the present invention permits the product to be formed during the welding process, it does not use pre-forming in order for the edges to approach each other end-to-end to achieve the strength of a butt weld.

Claim 6 as now amended recites:

A method for welding together two layers of thermoplastic material, comprising the steps of:

providing first and second opposed dies, each of said dies having a flat portion and defining a recess adjacent to said flat portion;

placing at least two substantially flat layers of thermoplastic material between said first and second opposed dies, with the flat portions of the dies opposite each other and the recessed portions of the dies opposite each other;

applying energy to said dies to melt the thermoplastic material between said dies;

pressing said dies together to compress and reduce the thickness of the material between the flat portions of the dies at least 70%, thereby extruding some of the thermoplastic material into the recesses of said dies; and

producing a weld that is at least 50% as strong as one of the layers of the thermoplastic material.

The invention recited in claim 6 is not taught or suggested by the references. While the Dojan reference does teach welding flat layers of material together, it teaches against compressing the material to reduce its thickness at least 70%, and it does not teach a way to compress the material at least 70% to produce a weld that is at least 50% as strong as one of the layers of the thermoplastic material. Neither the Jones-Hinton nor the Rempel reference teaches a way to modify the Dojan method in order to achieve the claimed invention. Both Jones-Hinton and Rempel teach that the layers must be pre-formed prior to welding, so that the edges to be welded together are approaching each other end-to-end. This means the layers are not flat. These references do not teach how to obtain the advantages of butt welding in a product that is not pre-formed (a product in which substantially flat layers of material are inserted between the dies).

Claim 8 as amended recites the additional step of causing the layers to be held apart from each other throughout the extruding process. Dojan does not teach this step. Instead, in Dojan, the layers are not separated until after the material has been extruded sufficiently to push them apart. Again, the other references do not suggest holding flat layers apart during the extrusion process. Instead, they teach pre-forming of the material into a shape that is not flat prior to the extrusion process.

Claim 9 recites the step of holding the layers apart by inflating the item. As explained in the specification, this may be achieved by pulling a vacuum on the outside of the dies to pull the layers apart and allowing gas to fill the interior or by injecting pressurized gas into the interior between the layers of material. This is not taught by the Dojan reference. Rempel teaches that inflation pressure may be used within the article by providing "ammonia or other pills inserted in the lower article halves prior to the butt-splicing". Rempel does not suggest a reason to apply pressure to inflate the Dojan product during the welding operation. Further, it is not clear how such pressure could be applied in the Dojan design, since the product is not pre-formed to provide a place to insert an inflation "pill" and since the valve of Dojan remains open during the welding process and does not form a closed perimeter that could be sealed and inflated.

Nor would the invention recited in claim 9 be an obvious combination of Jones-Hinton and Rempel, since neither of these references teaches insertion of substantially flat layers between the dies as required in claim 6.

Claim 10 depends from claim 6 and adds the step of damming the side of the flat portions opposite the recesses in order to direct extruded material toward the recesses using a dam that projects beyond a plane formed by the flat surface of its die. While a form of damming is used in Dojan, it is used to prevent the bead from forming, not to encourage formation of the bead. In order to form the bead, the dam is eliminated at the inlet area of the valve. This is explained in paragraph 0090. There is no suggestion to use damming to promote the flow of material toward the recesses to increase the size of the bead. There also is no dam that projects beyond the plane of the flat surface of the die as recited in this claim. As shown in Figure 3E, the weld flow director 174b of Dojan is actually recessed from the flat surface rather than projecting beyond it.

As was explained above, Jones-Hinton and Rempel are entirely different arrangements from the invention recited in claim 6. In these references, pre-formed hemispheres are being joined end-to-end rather than joining together substantially flat layers. Thus, they do not teach the combination recited in claim 10. They also do not teach a projecting dam as currently recited.

Claim 11 depends from claim 9 and adds the damming to direct extruded material toward the recesses. This also is not taught or suggested by the art.

Claim 12 recites the following:

A method for welding together layers of thermoplastic material of uniform thickness to form an airtight, inflatable product, comprising the steps of:

providing first and second opposed dies including opposed flat surfaces and opposed recesses adjacent to said opposed flat surfaces, so as to define the perimeter of the inflatable product;

placing the substantially flat layers of thermoplastic material between said opposed dies;

applying energy to melt the thermoplastic material between the opposed flat surfaces;

injecting gas between said layers in order to hold the layers apart from each other within said perimeter; and

pressing said dies together to reduce the thickness of the thermoplastic material between the flat surfaces at least 60% in order to extrude some of the melted material into the recesses.

This claim was rejected as obvious based on Jones-Hinton and Rempel. These references are not inserting substantially flat layers of thermoplastic material between the dies as now claimed. Instead, they are pre-forming the material to form two hemispheres and are then butt welding the hemispheres together.

Claim 13 depends from claim 12 and adds a valve extending through one of the layers and injecting gas through the valve. This is not taught by any of the references.

Claim 30 has been added. This claim depends from claim 12 and adds that the step of injecting gas occurs before the step of applying energy to melt the thermoplastic material, and wherein the gas pushes the extruded material against the recesses.

Claim 31 has been added. This claim depends from claim 8 and adds that each of the dies also has a steeply tapered wall adjacent its respective recess, and includes the step of pressing the layers against their steeply tapered walls while the energy is being applied.

While the end wall of the die in Dojan may be considered to be a steeply tapered wall adjacent to the recess, the layers are not pressed against that wall. No such steeply tapered wall can be found in the Jones-Hinton or Rempel references.

Since all the claims define an invention that is both novel and unobvious in view of the prior art, Applicant respectfully requests allowance of all the claims now pending in the present application. If there are any remaining problems with this application, Applicant's attorney would appreciate a call from the Examiner to help expedite their resolution.

Respectfully submitted,

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